REMARKS

By the present amendment and response, independent claims 1 and 10 have been amended to incorporate limitations of dependent claims 6 and 14, which have been canceled. As a result of the above amendments, no new claim language requiring a search or further consideration has been introduced. Thus, claims 1-5, 7-13, and 15-18 are pending in the present application. Reconsideration and allowance of pending claims 1-5, 7-13, and 15-18 in view of the following remarks are requested.

The Examiner has rejected claims 10 and 16 under 35 USC §102(b) as being anticipated by U.S. patent number 3,862,017 to Tsunemitsu et al. ("Tsunemitsu"). For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claim 10, is patentably distinguishable over Tsunemitsu.

The present invention, as defined by independent claim 10, teaches, among other things, a metal resistor situated between a first and a second intermetallic dielectric layer and "a dielectric cap layer situated between said metal resistor and said second intermetallic dielectric layer." As disclosed in the present application, the present invention achieves a metal resistor that can be advantageously added to a standard aluminum backend process used in IC chip fabrication without impacting or disturbing the aluminum backend process flow. Also, the invention's novel scheme of interrupting a standard two-step dielectric deposition to integrate the invention's metal resistor between two interconnect metal layers does not significantly increase the via etch depth, and thus advantageously allows the via etch process to be simplified.

Additionally, as disclosed in the present application, by situating a dielectric cap layer over a resistor metal layer, the present invention can advantageously provide an antireflective coating for more exact patterning of the resistor metal layer during formation of the invention's metal resistor. Moreover, after formation of the invention's metal resistor, the dielectric cap layer can be utilized to advantageously provide a selective etch stop for subsequent via etch and to advantageously protect the top surface of the metal resistor.

In contrast to the present invention as defined by amended independent claim 10, Tsunemitsu does not teach, disclose, or suggest a metal resistor situated between a first and a second intermetallic dielectric layer and "a dielectric cap layer situated between said metal resistor and said second intermetallic dielectric layer." Tsunemitsu specifically discloses tantalum resistor 16, which is formed on the surface of alumina film 15 and which is surrounded and covered by tantalum oxide film 17. See, for example, column 3, lines 44-47 and Figure 1 of Tsunemitsu. In Tsunemitsu, an anodic oxidation process is applied to tantalum film 47 to form tantalum resistor 16. See, for example, Tsunemitsu, column 5, lines 16-32. As a result of the anodic oxidation process, tantalum resistor 16 is formed in a portion of tantalum film 47 that is covered by photo-resist and the uncovered portion of tantalum film 47 is transformed into tantalum oxide film 17. See, for example, Tsunemitsu, column 5, lines 21-32.

However, Tsunemitsu does not teach, disclose, or suggest forming a dielectric cap layered over tantalum resistor 16. Moreover, tantalum resistor 16 is formed by utilizing

an anodic oxidation process, wherein tantalum resistor 16 is formed in a masked portion of tantalum film 47 and the unmasked remainder of tantalum film 47 is converted into tantalum oxide film 17. Thus, in Tsunemitsu, since tantalum resistor 16 is surrounded by tantalum film 47 as a result of the process utilized to form tantalum resistor 16, a dielectric cap layer cannot be formed on tantalum resistor 16. Thus, by forming tantalum resistor 16 in the manner disclosed in Tsunemitsu, Tsunemitsu teaches away from forming a dielectric cap layer on tantalum resistor 16. As such, the advantages of utilizing a dielectric cap layer, some of which were discussed above, cannot be achieved by Tsunemitsu.

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claim 10, is not suggest, disclosed, or taught by Tsunemitsu. Thus, amended independent claim 10 is patentably distinguishable over Tsunemitsu and, as such, claim 16 depending from amended independent claim 10 is, *a fortiori*, also patentably distinguishable over Tsunemitsu for at least the reasons presented above and also for additional limitations contained in dependent claim 16.

The Examiner has further rejected claims 1 and 3 under 35 USC §103(a) as being unpatentable over Tsunemitsu in view of U.S. patent number 5,120,572 to Nalin Kumar ("Kumar"). For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claim 1, is patentably distinguishable over Tsunemitsu, Kumar, or any combination thereof.

The present invention, as defined by amended independent claim 1, also teaches, among other things, a metal resistor situated between a first and a second intermetallic dielectric layer and "a dielectric cap layer situated between said metal resistor and said second intermetallic dielectric layer." Thus, for similar reasons as discussed above, amended independent claim 1 is also patentably distinguishable over Tsunemitsu.

In contrast to the present invention as defined by amended independent claim 1, Kumar does not teach, disclose, or suggest a metal resistor situated between a first and a second intermetallic dielectric layer and "a dielectric cap layer situated between said metal resistor and said second intermetallic dielectric layer." Kumar specifically discloses electrical connections 92 and 94, which are connected to via pillars 84 from resistor 48. See, for example, column 5, lines 49-51 and Figure 30 of Kumar. However, Kumar fails to teach, disclose, or suggest a metal resistor situated between a first and a second intermetallic dielectric layer and "a dielectric cap layer situated between said metal resistor and said second intermetallic dielectric layer."

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claim 1, is not suggest, disclosed, or taught by Tsunemitsu and Kumar, singly, or in combination. Thus, the present invention, as defined by amended independent claim 1, is patentably distinguishable over Tsunemitsu and Kumar, and, as such, claim 3 depending from amended independent claim 1 is, *a fortiori*, also patentably distinguishable over Tsunemitsu and Kumar for at least the

reasons presented above and also for additional limitations contained in dependent claim 3.

The Examiner has further rejected claim 2 under 35 USC §103(a) as being unpatentable over Tsunemitsu and Kumar in view of U.S. patent number 4,795,921 to Kato et al ("Kato"). As discussed above, amended independent claim 1 is patentably distinguishable over Tsunemitsu and Kumar and, as such, claim 2 depending from amended independent claim 1 is, *a fortiori*, also patentably distinguishable over Tsunemitsu and Kumar for at least the reasons presented above and also for additional limitations contained in dependent claim 2.

The Examiner has further rejected claims 4 and 5 under 35 USC §103(a) as being unpatentable over Tsunemitsu in view of Kumar. As discussed above, amended independent claim 1 is patentably distinguishable over Tsunemitsu and Kumar and, as such, claims 4 and 5 depending from amended independent claim 1 are, *a fortiori*, also patentably distinguishable over Tsunemitsu and Kumar for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The Examiner has further rejected claims 6 and 7 under 35 USC §103(a) as being unpatentable over Tsunemitsu and Kumar and further in view of U.S. patent number 6,232,194 to Yaung et al. ("Yaung"). As discussed above, amended independent claim 1 is patentably distinguishable over Tsunemitsu and Kumar and, as such, claim 7 depending from amended independent claim 1 is, *a fortiori*, also patentably distinguishable over

Tsunemitsu and Kumar for at least the reasons presented above and also for additional limitations contained in dependent claim 7.

The Examiner has further rejected claims 8 and 9 under 35 USC §103(a) as being unpatentable over Tsunemitsu and Kumar and further in view of U.S. patent number 5,525,831 to Ohkawa et al. ("Ohkawa"). As discussed above, amended independent claim 1 is patentably distinguishable over Tsunemitsu and Kumar and, as such, claims 8 and 9 depending from amended independent claim 1 are, *a fortiori*, also patentably distinguishable over Tsunemitsu and Kumar for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The Examiner has further rejected claim 11 under 35 USC §103(a) as being unpatentable over Tsunemitsu in view of Kato. As discussed above, amended independent claim 10 is patentably distinguishable over Tsunemitsu and, as such, claim 11 depending from amended independent claim 10 is, *a fortiori*, also patentably distinguishable over Tsunemitsu for at least the reasons presented above and also for additional limitations contained in dependent claim 11.

The Examiner has further rejected claims 12 and 13 under 35 USC §103(a) as being unpatentable over Tsunemitsu. As discussed above, amended independent claim 10 is patentably distinguishable over Tsunemitsu and, as such, claims 12 and 13 depending from amended independent claim 10 are, *a fortiori*, also patentably distinguishable over Tsunemitsu for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The Examiner has further rejected claims 14 and 15 under 35 USC §103(a) as being unpatentable over Tsunemitsu in view of Yaung. As discussed above, amended independent claim 10 is patentably distinguishable over Tsunemitsu and, as such, claim 15 depending from amended independent claim 10 is, *a fortiori*, also patentably distinguishable over Tsunemitsu for at least the reasons presented above and also for additional limitations contained in dependent claim 15.

The Examiner has further rejected claims 17 and 18 under 35 USC §103(a) as being unpatentable over Tsunemitsu in view of Ohkawa. As discussed above, amended independent claim 10 is patentably distinguishable over Tsunemitsu and, as such, claims 17 and 18 depending from amended independent claim 10 are, *a fortiori*, also patentably distinguishable over Tsunemitsu for at least the reasons presented above and also for additional limitations contained in each dependent claim.

Based on the foregoing reasons, the present invention, as defined by amended independent claims 1 and 10 and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, claims 1-5, 7-13, and 15-18 pending in the present application are patentably distinguishable over the art cited by the Examiner. As such, and for all the foregoing reasons, an early allowance of claims 1-5, 7-13, and 15-18 pending in the present application is respectfully requested.

Respectfully Submitted,
FARJAMI & FARJAMI LLP

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Michael Farjami, Esq.
Reg. No. 38, 135

Michael Farjami, Esq.
FARJAMI & FARJAMI LLP
16148 Sand Canyon
Irvine, California 92618
Telephone: (949) 784-4600
Facsimile: (949) 784-4601

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